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NITRONOX SCAVENGER SYSTEM USER'S MANUAL / INSTRUCTIONS

Examination

All components should be removed from their respective shipping containers and examined. Any omissions and/or damage should be reported to the Porter dealer, immediately.

User Responsibility

The Nitronox® Scavenger System is designed for use with the Nitronox Hospital Model Inhalation Analgesia Machine (Refer to Instructions 10115900), and to perform in accordance with specifications herein when installed, operated and maintained as instructed in this manual. It should be carefully read and understood prior to operation and use of the scavenger system.

Warnings

- **Use Scavenging** Monitor for N2O in the patient treatment area to insure that controls are effective in achieving low levels of ppm (parts per million) exposure. Contact Porter or Authorized Distributor for details on monitors and testing.

- The Nitronox Scavenger is intended to be used by medical personnel trained in its use and the use of nitrous oxide and oxygen for medical applications.

- An EXPLOSION hazard exists when flammable agents are exhausted into the vacuum system (Page 7).

- The Nitronox Scavenger interface is supplied with a removable flow resistor. This foam resistor must be REPLACED every six months to help prevent the possibility of increased resistance due to particle entrapment (Page 8).

- Medical workers are exposed to N_2O during administration of N_2O/O_2 conscious sedation analgesia. NIOSH has recommended that exposures should be minimized. Contact NIOSH (1-800-35-NIOSH) to receive NIOSH Publications on *Control of Nitrous Oxide in Dental Operatories.* Exposure can be minimized by effective controls. National Institute for Occupational Safety and Health (NIOSH) publications state that controls, including System Maintenance, Ventilation and Work Practices can effectively reduce N_2O concentrations in patient procedures. Your accessory Nitronox Scavenger System is an important part of the system of controls in medical settings.

Fig. 1

The Nitronox Scavenger System is a device for the removal of patient exhaled O_2 / N_2O gas mixtures generated from the Hospital Nitronox. The exhaled gases are routed through the device to a remotely located central vacuum system. The Nitronox Scavenger and central vacuum systems provide dilution and disposal of mixed waste gases. The scavenger system consists of components necessary to transfer patient exhaled gas mixtures to the source of vacuum at the wall.

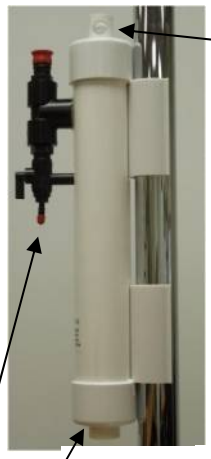

Fig. 1.1
Interface

Fig. 1.2
Demand Valve
Collection Manifold

Fig. 1.3
Demand Valve
Collection Manifold
19mm Hose

Fig. 1.4
19mm Hose

The system components are (Fig. 1):

- A COLLECTION MANIFOLD (Fig. 1.2) located at the exhaust ports of the Demand [breathing] Valve (Figs. 1.2, 1.3).

- A cylindrical INTERFACE (Fig. 1.1) to connect the central vacuum system with the scavenger collection manifold. It contains:

    - Orifices to limit vacuum pressure and flow.
    - Opening to ambient to help prevent over/under pressurization of the patient exhaust circuit.
    - A valve to automatically drain any internal condensation.

- The interface is connected to the rear of the support pole to the Hospital Nitronox unit.

- A corrugated 19mm hose (Fig. 1.4) to connect the collection manifold to the interface.

The gas flow path through the scavenger system starts with patient exhalation into the exhaust ports of the demand valve and then to the collection manifold into the 19 mm scavenger hose. The hose leads the gas into the scavenger interface. The interface is open at the top to ambient via a calibrated foam resistor. In addition, the interface contains an internal pathway for gas passage permitting waste gas to follow a preferential path to wall vacuum.

From the internal pathway of the interface, the waste gas flows through a ball-type control valve to a calibrated orifice contained within the barbed wall vacuum connector. The final gas path is through the DISS or QUICK connect vacuum hose to the wall vacuum outlet and the central vacuum pump system (or appropriate connections to a portable vacuum source).

If central vacuum flow through the calibrated orifice exceeds the exhaled flow from the patient, room air will be drawn from ambient into the vacuum system via the scavenger interface. Also the internal volume of the interface acts as a surge chamber to absorb a short duration of excessive patient flow. During this short duration, excess gas will fill the interface allowing time for the vacuum flow to exhaust the gas during the next patient inspiration. Under abnormally large exhalations, it is possible that the excess exhaled gas may exceed the capacity of the interface chamber, and exhaust to ambient. This entrance and exit of gas to ambient is a feature operating only during transient unbalanced periods.

Control of excess flow from the central vacuum through the orifice is provided by the ball control valve. The ball valve limits the central vacuum flow between an upper (maximum) and a lower (minimum) limit. No control other than the passive interface capacity and preferential flow path within the interface is provided for excess patient exhalation such as during a cough.

An automatic relief valve is provided in the bottom of the interface to prevent condensation from causing a water seal of any internal gas passages. This is another feature operating only when condensation occurs.

Installation

Mobile Stand Mount

Connect the cylindrical Nitronox Scavenger interface to the center column assembly of the Mobile Stand (Figs. 2.1, 2.2). Use the mounting clips of the interface to position the assembly on the column. Orient the interface assembly vertically with open end (foam resistor) up and condensation relief drain valve down.

Fig. 2.1

Fig. 2.2

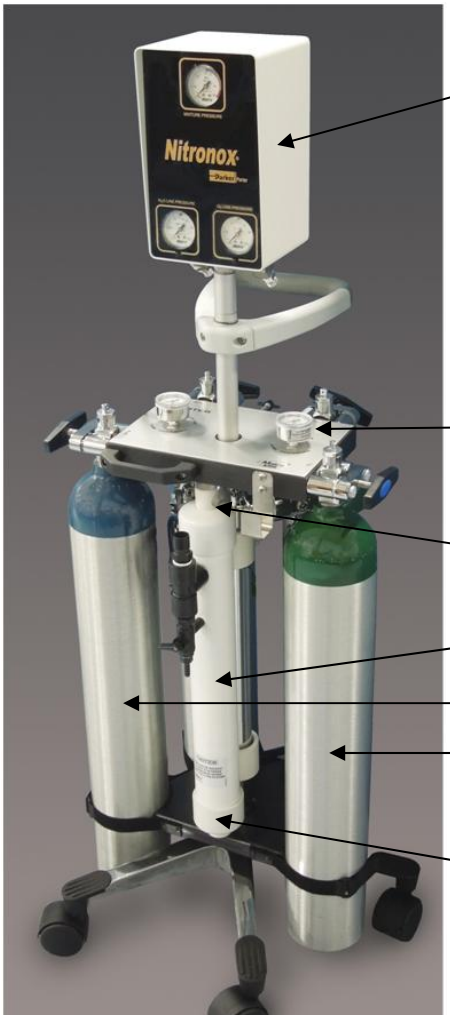

Fig. 3.1 E-Stand with 4 cylinders

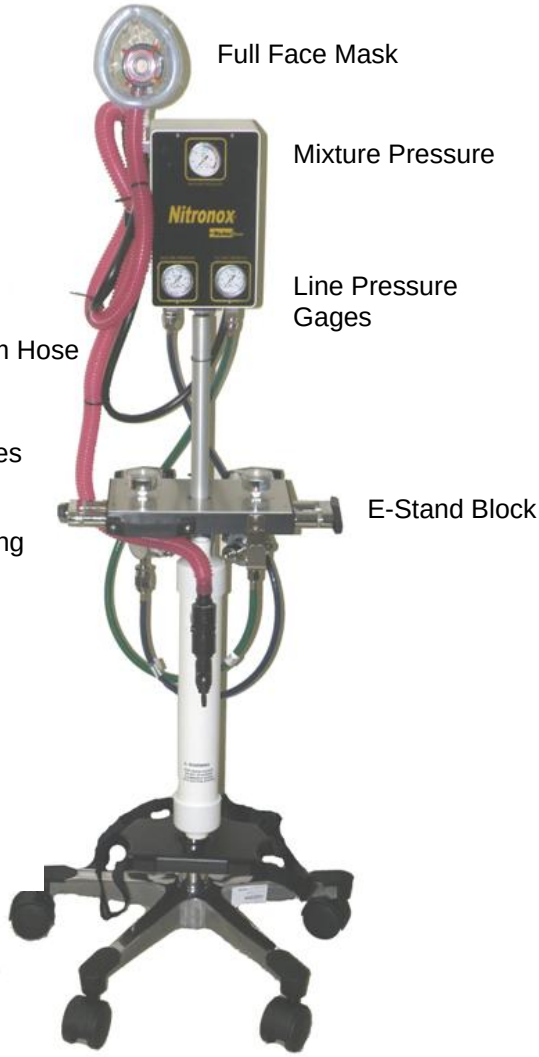

Fig. 3.2 E-Stand with Nitronox & Scavenger

Installation

Mobile "E" Stand Mount

The Porter Mobile "E" Stand is for use with two "E" cylinders of O_2 and two "E" cylinders of N_2O (Figs. 3.1, 3.2). The two pressure gages reflect cylinder pressure only. When the gas supply is opened, gas will flow through the check valves into the block and be regulated down to 50 PSIG at the regulators, out through the hoses to the Nitronox. The check valves prevent the gas from flowing between cylinders or out into the room if only one cylinder is in use. Each Mobile Stand may be adjusted to a desired height for use and storage. Refer to FM-916 Mobile "E" Stand Installation and Instructions for information on monthly checks, cylinder installation, height adjustment, check valve replacement.

Connect the cylindrical INTERFACE to the center column assembly of the Mobile "E" Stand. Use the mounting clips of the interface to position the assembly on the column. Orient the interface assembly vertically with ambient open end (foam resistor) up and condensation relief drain valve down. Position the interface between the four cylinder positions as shown in Fig. 3.1 (cylinders are closer together on opposite side).

Installation

Wall Mount: Figs. 4, 5

1. Hold the scavenger interface against the wall in the desired mounting location.

2. Mark four mounting-hole locations on wall using the interface mounting plates as templates.

3. Drill four holes in the locations marked:

   Note:
   - For dry wall or plaster, drill hole suitable for a screw attachment.
   - For wooden studs, drill appropriate pilot hole, 1-1/2 inches deep to accept mounting screws.

4. Insert appropriate receptacle (not provided) in hole, if necessary.

5. Mount the scavenger interface using four screws (not provided) in the prepared locations (Fig. 2).

   Note: Mounting installation must be done on both the top and the bottom brackets.

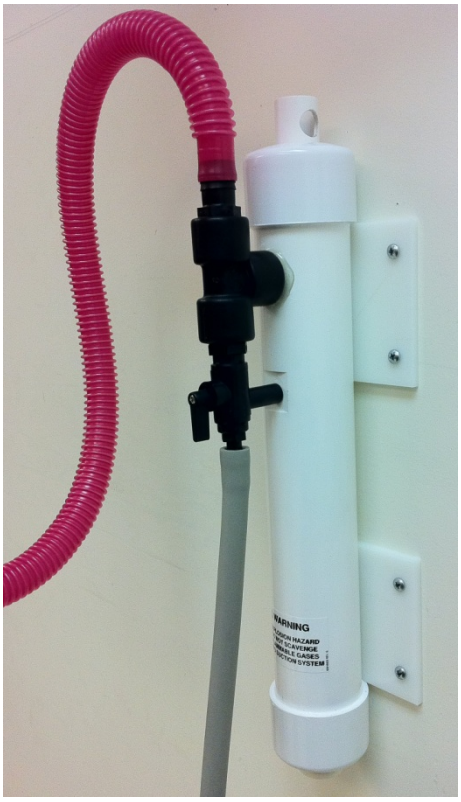

Fig. 4 Scavenger Wall Mount

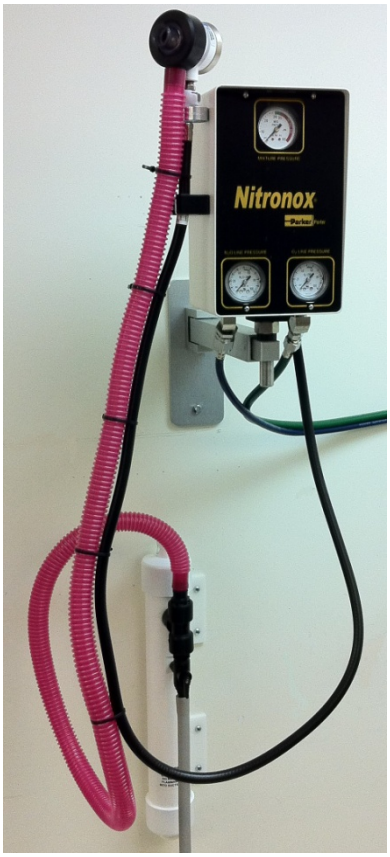

Fig. 5 Nitronox Housing Wall Mount With Scavenger Wall Mount

Collection Manifold: Figs. 6.1, 6.2

Push the collection manifold onto the plastic outlet housing of the demand valve until the o-rings seat and the manifold bottoms (Fig. 6.1). Turn the collection manifold 19 mm outlet port clockwise to be parallel with the delivery hose (Fig. 6.2).

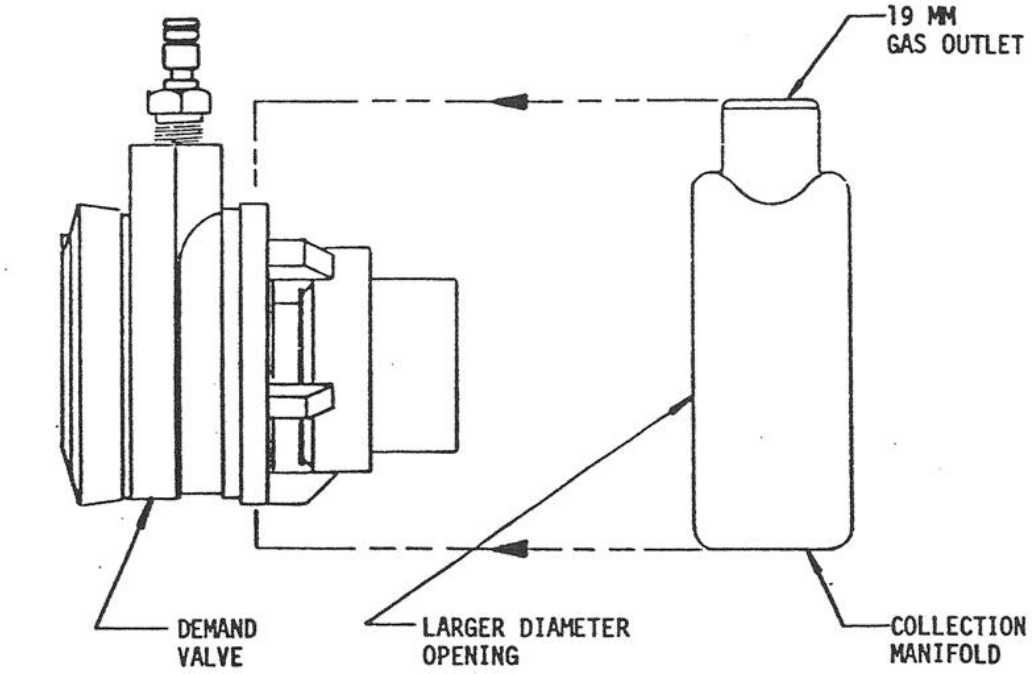

Fig. 6.1

Fig. 6.2

Hose Connections: Fig. 7

1. Connect the 19 mm scavenger hose between the 19 mm connectors on the collection manifold and the interface (Fig. 7.1).

2. Connect vacuum hose between the vacuum source inlet (using appropriate connection such as DISS, QUICK connect, etc.) and the barbed outlet connector on the interface. Push the tubing on the barb so that two to three barbs are covered.

   Note: Hold the barbed outlet while pushing tubing onto barb to reduce excess strain.

Fig. 7.1

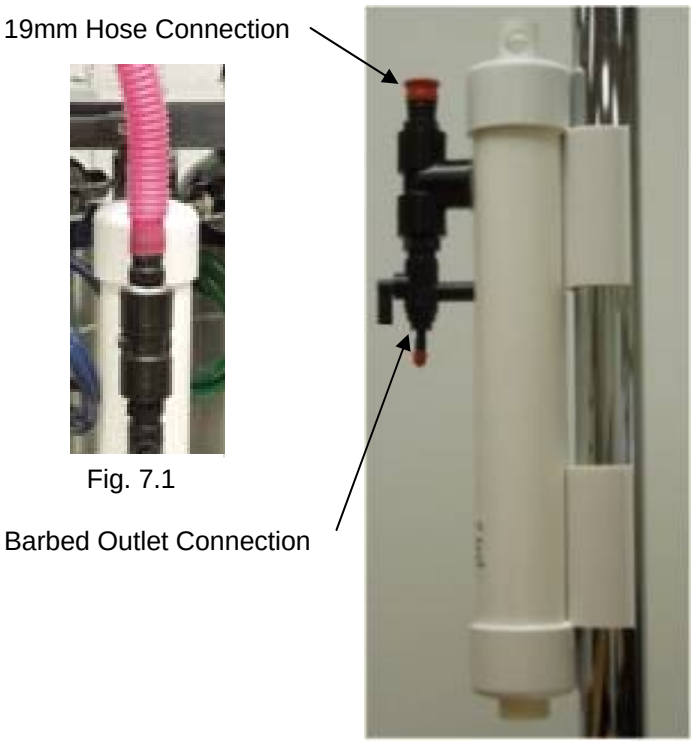

Fig. 7

Warning

An EXPLOSION hazard exists when flammable agents are exhausted into the central vacuum system.

Operation

1. Connect wall or Mobile "E" Stand gas supplies – O_2 and N_2O. Connect vacuum source to Nitronox Scavenger barb.

2. Adjust the position of the collection manifold by rotating clockwise so that the hoses lie in a parallel position (Fig. 8). Secure the delivery hose and the 19 mm scavenger hose together using the five tie wraps supplied (Fig. 9, 9.1) (see Tie Wrap Instructions FM-1236). Space the tie wraps equally starting at the demand valve and working back to the scavenger interface.

Fig. 8

Fig. 9.1

Fig. 9

Fig. 10

3. For best scavenging vacuum flow, turn the ball valve lever to the vertical (full on position) (Fig. 10).

   Note: With the ball valve lever in the full on position, the vacuum flow should accommodate the exhaust gas from all normal breathing patterns (30 – 35 LPM, maximum).

4. If the overall demand for vacuum is overloading the central system, the ball valve may be slightly throttled to reduce vacuum flow by turning the ball lever to the 45º from vertical position.

   Note: With the lever in the 45º from vertical position, the ball valve will still allow a vacuum flow of 8 to 12 LPM, minimum.

5. The interface is designed so that condensed water vapor should discharge from the bottom, if its volume exceeds 40 to 50 cc/mL.

Maintenance

1. Replacement of the foam flow resistor approximately every six months and periodic replacement of the Scavenger Hose Assembly.

Warning

The foam flow resistor is to be replaced approximately every 6 months to help prevent the possibility of increased resistance due to particle entrapment.

2. Pull the foam resistor (one inch, diameter, by six inches, long) from the top center hole of the interface cylinder with the use of forceps or needle nose pliers.

3. Using a 12-inch long, stiff strip of music wire (or equivalent), insert a new foam resistor into the interface top-center hole until the top of the foam resistor reaches the lower edge of the horizontal vent holes.

4. Remove the wire, holding top of the foam resistor with the forceps or needle nose pliers.

Specifications

Note: Porter may apply technical advances whenever it is desirable. Specifications are subject to change WITHOUT NOTICE. Porter should be contacted for current information.

Materials of Construction - Plastics: ABS, PVC, Polypropylene, Nylon

Dimensions:

	Diameter	Length
Collection Manifold	2-1/4” (5.7 cm)	1” (2.5 cm)
Interface	2-1/2” (6.4 cm)	20” (50.8 cm)
Scavenger Hose (19 mm)	19 mm, ID	60” (152 cm)
Vacuum Hose (not supplied)	3/8” (9.5 mm), ID	As Required

Vacuum Source:

Pressure	-14” to -21” Hg (-356 mm to -533 mm Hg)
Flow	2.0 to 3.5 SCFM (56.6 to 100 LPM)

Interface Flow:

Ball Valve Full Vertical (Max. Flow)	30 – 35 LPM	Ball Valve 45º Position (Min. Flow)	8 – 12 LPM

Relief Valve (Condensation):

Relief Volume	40 – 50 cc/mL
Retention Volume	5 – 10 cc/mL

Ambient Temperature Limits:

Minimum	40ºF (5ºC)	Maximum	140ºF (60ºC)

Replacement Parts: Contact Porter

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